

1 [0045] WHAT IS CLAIMED IS:

- 2 1. A magnetic mass storage memory device comprising:
- 3 a) a read disk having an array of read heads;
- 4 b) a storage disk having an array of magnetic storage elements wherein the
- 5 read heads associate with a corresponding storage element on the storage disk; and
- 6 c) a control circuit to select the desired storage element that controls an
- 7 orientation of a magnetic field of a corresponding read head.
- 1 2. The memory device according to Claim 1, wherein the read head comprising:
- 2 a) a pinned layer; and
- 3 b) a free layer.
- 1 3. The memory device according to claim 2, wherein the pinned layer has a fixed
- 2 magnetic orientation.
- 1 4. The memory device according to claim 3, wherein the free layer has a variable
- 2 magnetic orientation.
- 1 5. The memory device according to claim 4, wherein the storage element
- 2 comprising a second free layer.
- 1 6. The memory device according to claim 5, wherein the second free layer has a
- 2 variable magnetic orientation.
- 1 7. The memory device according to claim 6, wherein the magnetic orientation of
- 2 the first free layer is regulated by the magnetic orientation of the second free layer.
- 1 8. The memory device according to Claim 7, wherein a resistance of the
- 2 corresponding read head is indicative of a value stored therein.
- 1 9. The memory device according to claim 8 wherein the read head is an MR.

1 10. The memory device according to Claim 8 wherein the read head is a GMR.

1 11. The memory device according to Claim 8 wherein the read head is a CMR.

1 12. A magnetic mass storage memory device comprising:

2 a) a read disk having an array of read heads, each read head  
3 comprising a plurality of magnetic layers;

4 b) a storage disk having a plurality of conductive lines with an array of  
5 magnetic storage elements disposed between the conductive lines corresponding the read  
6 heads; and

7 c) a control circuit to select the desired storage element from an array of  
8 storage elements such that a current through the conductive lines will induce a magnetic  
9 field in the selected storage element wherein the induced magnetic field controls a  
10 direction of a magnetic field of at least one layer in the plurality of magnetic layers in the  
11 corresponding read head.

1 13. The memory device according to claim 12, wherein the plurality of magnetic  
2 layers comprising:

3 a) a pinned layer; and

4 b) a free layer.

1 14. The memory device according to claim 13, wherein a direction of the magnetic  
2 field of the pinned layer is fixed.

1 15. The memory device according to claim 14, wherein the direction of the magnetic  
2 field of the free layer is variable.

1 16. The memory device according to claim 15, wherein the storage element  
2 comprising a second free layer.

1 17. The memory device according to claim 16, wherein a direction of a magnetic  
2 field of the second free layer is regulated by a current through the conducting lines.

1 18. A method for magnetic writing comprising the steps of:

2 a) selecting a storage element from an array of storage elements on a storage disk  
3 by a control circuit;

4 b) inducing a magnetic field in the storage element by passing current through a  
5 plurality of conducting lines around the storage element; and

6 c) controlling the magnetic field orientation of a layer in a corresponding read  
7 head by the induced magnetic field .

8 19. The method according to claim 18 wherein the storage element and the layer in  
9 the corresponding read head are magnetically coupled.

10 20. The method according to claim 19, wherein the read head is a GMR.

1 21. A method of magnetic reading on a storage device comprising the steps of:

2 a) selecting a magnetic storage element, from an array of magnetic storage  
3 elements on a storage disk;

4 b) passing current through conducting lines surrounding the magnetic storage  
5 element;

6 c) inducing a magnetic field around the magnetic storage element by the current  
7 through the conducting lines;

8 d) setting the direction of magnetization of a second free layer in the storage  
9 element and

10 d) controlling a direction of the magnetization of a free layer in a corresponding  
11 read head from an array of read heads on a read disk by the induced magnetic field; and

12 e) measuring the resistance of the corresponding read head.